Part 1

Zeros of Functions

ZoF1.tex

Exercise 1 (a) *Let f be a function defined by $f(x) = 23$.*

The function f has $\boxed{0}$ *zero(s).*

(b) *Let g be a function defined by $g(x) = x^2 + 2x - 2$.*

The function g has $\boxed{2}$ *zero(s).*

(c) *Let h be a function defined by $h(x) = \dfrac{x^2 - 9}{x - 3}$.*

The function g has $\boxed{1}$ *zero(s).*

ZoF10.tex

Exercise 2 (a) *Let f be a function defined by $f(x) = e^x$.*

The function f has $\boxed{0}$ *zero(s).*

(b) *Let g be a function defined by $g(x) = e^x - 1$.*

The function g has $\boxed{1}$ *zero(s).*

(c) *Feel free to use Desmos or another graphing calculator for the following problem.*

Let h be a function defined by $h(x) = -4x^3 - 8x^2 + 4x + 7$.

The function g has $\boxed{3}$ *zero(s).*

ZoF2.tex

Exercise 3 *For each function, select all zeros of the given function.*

(a) *Let f be a function defined by $f(x) = 3x - 5$. Select all zeros of f.*

Select All Correct Answers:

(i) $\dfrac{1}{3}$

(ii) $\dfrac{3}{5}$

(iii) 1

(iv) $\dfrac{5}{3}$ ✓

Acknowledgements: Stitz Zeager Open Source Mathematics
(https://www.stitz-zeager.com/)

(b) *Let g be a function defined by $g(x) = 5 - x$. Select all zeros of g.*

Select All Correct Answers:

(i) 1
(ii) 4
(iii) 5 ✓
(iv) -5

(c) *Let h be a function defined by $h(x) = \dfrac{2-x}{3}$. Select all zeros of h.*

Select All Correct Answers:

(i) $\dfrac{2}{3}$
(ii) $\dfrac{3}{2}$
(iii) 3
(iv) 2 ✓

`ZoF3.tex`

Exercise 4 *For each function, select all zeros of the given function. If there are none, do not select any options.*

(a) *Let f be a function defined by $f(x) = |x + 7|$. Select all zeros of f.*

Select All Correct Answers:

(i) 0
(ii) 7
(iii) -7 ✓
(iv) -14

(b) *Let g be a function defined by $g(x) = |x| - 7$. Select all zeros of g.*

Select All Correct Answers:

(i) 0
(ii) 7 ✓
(iii) -7 ✓

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(iv) -14

(c) *Let h be a function defined by $h(x) = \frac{1}{4}|x-6|-3$. Select all zeros of h.*

Select All Correct Answers:

(i) -6 ✓
(ii) 0
(iii) 6
(iv) 12
(v) 18 ✓

(d) *Let j be a function defined by $j(x) = x - |x| + 22$. Select all zeros of j.*

Select All Correct Answers:

(i) -22
(ii) -11 ✓
(iii) 0
(iv) 11
(v) 22

`ZoF4.tex`

Exercise 5 *For each function, select all zeros of the given function. If there are none, do not select any options.*

(a) *Let f be a function defined by $f(x) = x^2 + 9$. Select all zeros of f.*

Select All Correct Answers:

(i) 3
(ii) -3
(iii) 0
(iv) 9

(b) *Let g be a function defined by $g(x) = -(x-5)^2$. Select all zeros of g.*

Select All Correct Answers:

(i) 0

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(ii) -5

(iii) 5 ✓

(iv) 2

(c) *Let h be a function defined by $h(x) = x^2 - 3x - 4$. Select all zeros of h.*

Select All Correct Answers:

(i) -1 ✓

(ii) 0

(iii) 2

(iv) 3

(v) $\frac{4}{3}$

(vi) 4 ✓

(d) *Let j be a function defined by $j(x) = -4(x+3)^2 + 20$. Select all zeros of j.*

Select All Correct Answers:

(i) $-3 - \sqrt{5}$ ✓

(ii) $3 - \sqrt{5}$

(iii) $-3 + \sqrt{5}$ ✓

(iv) $3 + \sqrt{5}$

`ZoF5.tex`

Exercise 6 *The equation $12x - 3 = -5 - x$ can be rewritten as $f(x) = 0$ for some function f. In this case,*

$$f(x) = \boxed{13}x + 2.$$

The zero of f is $\boxed{-\frac{2}{13}}$.

`ZoF6.tex`

Exercise 7 *The equation $2x^2 - 3x - 2 = 5 - 3x$ can be rewritten as $f(x) = 0$ for some function f. In this case*

$$f(x) = \boxed{2}x^2 - 7.$$

Select the zeros of f below.

Select All Correct Answers:

(a) $\sqrt{\frac{7}{2}}$ ✓

(b) $-\sqrt{\frac{7}{2}}$ ✓

(c) $\sqrt{\frac{2}{7}}$

(d) 1.9

(e) 1.87

`ZoF7.tex`

Exercise 8 *In each part, select whether the term that best describes the prompt.*

(a) $27yz\sqrt{\ln(x)}$

Multiple Choice:

(i) *Expression* ✓
(ii) *Equation*

(b) $\sin(\cos(xy))$

Multiple Choice:

(i) *Expression* ✓
(ii) *Equation*

(c) $a^2 + b^2 = c^2$

Multiple Choice:

(i) *Expression*
(ii) *Equation* ✓

(d) $\cos(w) + 51e^x = 0$

Multiple Choice:

(i) *Expression*
(ii) *Equation* ✓

`ZoF9.tex`

Exercise 9 *In each part, select whether the term that best describes the prompt.*

(a) x^2

Multiple Choice:

(i) *Expression* ✓
(ii) *Equation*

(b) $\cos(x) = \sin(x)$

Multiple Choice:

(i) *Expression*
(ii) *Equation* ✓

(c) $27y^3 = 33$

Multiple Choice:

(i) *Expression*
(ii) *Equation* ✓

(d) $ax^2 + bx + c$

Multiple Choice:

(i) *Expression* ✓
(ii) *Equation*

ZoF8.tex

Exercise 10 *A ball is thrown straight upward from the ground. The distance the ball is from the ground is given by the function $f(x) = 9 - (x-3)^2$ where x is the time measured in seconds and $f(x)$ is the distance from the ground measured in feet. What time will the ball hit the ground?*

Multiple Choice:

(a) *0*

(b) *3*

(c) *4*

(d) *6* ✓

ZoF11.tex

Exercise 11 *Rowan has been driving at 60 miles per hour. In a horrible coincidence, their car has run out of gas, and the brakes have stopped working. Thankfully, they're driving on a completely straight country road with no other vehicles in sight.*

The speed of Rowan's car is given by a function v defined by $v(t) = 60 - \frac{t^2}{960}$, where t is in seconds. At what time (in seconds) will Rowan's car stop?

Multiple Choice:

(a) *200*

(b) *220*

(c) *240* ✓

(d) *260*

ZOP1.tex

Exercise 12 *Find the zeros of the following quadratic function. Use any method you want.*

$$f(x) = x^2 + 6x + 5$$

larger x value $x = \boxed{3}$ *smaller x value* $x = \boxed{2}$

ZOP2.tex

Exercise 13 *Find the zeros of the following quadratic function. Use any method you want.*

$$f(x) = -3x^2 + 10x - 7$$

larger x value $x = \boxed{\frac{7}{3}}$ *smaller x value* $x = \boxed{1}$

ZOP3.tex

Exercise 14 *Find the zeros of the following function. Use any method you want.*

$$p(x) = x^6 + 4x^5 + 4x^4$$

larger x value $x = \boxed{0}$ *smaller x value* $x = \boxed{-2}$

ZOP4.tex

Exercise 15 *Find the zeros of the following function.*

$$g(x) = -2x^4(x+1)^3(x-2)^2$$

largest x value $x = \boxed{2}$ *middle x value* $x = \boxed{0}$ *smallest x value* $x = \boxed{-1}$

ZOP5.tex

Exercise 16 *Find the zeros of the following function.*

$$z(x) = 4x(5x-1)(3x+8)(x-\sqrt{5})(x+\sqrt{5})$$

Enter the x values from smallest to largest

$$x_1 = \boxed{-\frac{8}{3}} \quad x_2 = \boxed{-\sqrt{5}} \quad x_3 = \boxed{0} \quad x_2 = \boxed{\frac{1}{5}} \quad x_3 = \boxed{\sqrt{5}}$$

ZOP6.tex

Exercise 17 *True or False?*
There is more than one polynomial with zeroes 1,2, *and* 6.

Multiple Choice:

(a) *True* ✓

(b) *False*

